WHAT IS CLAIMED IS:

1. A process for producing an inorganic oxide imprinted with a plurality of functional groups, comprising:

(a) contacting the inorganic oxide or a source thereof with an imprinting compound comprising (i) a plurality of functional moieties to be imprinted, (ii) a plurality of thermally labile protecting groups and (iii) a silicon- or germanium-containing moiety capable of serving as a linker for the imprinting compound to the inorganic oxide to form an inorganic oxide structure comprising immobilized imprinting compound; and

(b) removing a thermally labile portion of the imprinting compound from the oxide structure by thermolysis

2. A process for producing an inorganic oxide imprinted with a functional group, comprising:

(a) contacting the inorganic oxide or a source thereof with an imprinting compound comprising (i) a functional moiety to be imprinted, (ii) a thermally labile protecting group and (iii) a silicon- or germanium-containing moiety capable of serving as a linker for the imprinting compound to the inorganic oxide to form an inorganic oxide structure comprising immobilized imprinting compound; and

(b) removing a thermally labile portion of the imprinting compound from the oxide structure by thermolysis;

provided that if the oxide structure is an oxide substrate imprinted with a single functional group, then the imprinted group is other than isocyanate and the thermally labile protecting group is other than a carbamate of an aryl alcohol.

3. A process for producing a bulk imprinted inorganic oxide imprinted with one or a plurality of functional groups, comprising:

(a) copolymerizing a source of the organic oxide with an imprinting compound comprising (i) one or a plurality of functional moieties to be imprinted, (ii) one or a plurality of thermally labile protecting groups, and (iii) a silicon- or germanium-containing moiety capable of serving as a linker for the imprinting compound to the inorganic oxide to form an inorganic oxide structure comprising immobilized imprinting compound; and

(b) removing a thermally labile portion of the immobilized imprinting compound from the oxide structure by thermolysis.

4. A process for producing an inorganic oxide substrate imprinted with one or a plurality of functional groups, comprising:

(a) contacting a substrate comprising the inorganic oxide with an imprinting compound comprising (i) one or a plurality of functional moieties to be imprinted, (ii) one or a plurality of thermally labile protecting groups for the functional moieties, and (iii) a silicon- or germanium-containing moiety capable of serving as a linker for the imprinting compound to the inorganic oxide to form an inorganic oxide structure comprising immobilized imprinting compound; and

(b) removing a thermally labile portion of the imprinting compound by means of thermolysis;

provided that if the oxide structure is an oxide substrate imprinted with a single functional group, then the imprinted group is other than isocyanate and the thermally labile protecting group is other than a carbamate of an aryl alcohol moiety.

5. A process according to claim 1 in which the inorganic oxide comprises silica, germania, alumina, titania, one or more aluminophosphates, one or more silicaaluminophosphates, ceria, indium-tin oxide, or a mixture thereof.

6. A process according to claim 5 in which the inorganic oxide comprises silica.

7. A process according to claim 1 in which the inorganic oxide is a bulk oxide.

8. A process according to claim 1 in which the inorganic oxide is in the form of an oxide substrate.

9. A process according to claim 4 in which the inorganic oxide substrate comprises a particulate inorganic oxide.

10. A process according to claim 4 in which the inorganic oxide comprises a generally planar surface.

11. A process according to claim 1 in which the thermolysis is conducted by heating the product of step (a).

12. A process according to claim 11 in which the thermolysis is conducted by heating the product of step (a) at a temperature of from about room temperature to about 300°C.

13. A process according to claim 11 in which the thermolysis is conducted by heating the product of step (a) at a temperature of from about 90 to about 300°C.

14. A process according to claim 11 in which the thermolysis is conducted by heating the product of step (a) at a temperature of from about 120 to about 300°C.

15. A process according to claim 11 in which the thermolysis is conducted by heating the product of step (a) at a temperature of from about 240 to about 300°C.

16. A process according to claim 1 in which the thermolysis is conducted by subjecting the product of step (a) to electromagnetic radiation or to sonication.

17. A process according to claim 1 in which the functional moiety or plurality of moieties is selected from amine, thiol, isocyanate, carboxyl, hydroxyl, phenoxyl, phosphate and titanate.

18. A process according to claim 1 in which the oxide is imprinted with two or more different functional moieties.

19. A process according to claim 18 in which the oxide is imprinted with amine and thiol moieties.

20. A process according to claim 1 in which the functional moiety comprises an amine moiety or a plurality of amine moieties.

21. A process according to claim 20 in which the thermally labile protecting group comprises a carbamate.

22. A process according to claim 21 in which the carbamate is produced from an alcohol.

23. A process according to claim 22 in which the alcohol is a tertiary alcohol.

24. A process according to claim 23 in which the tertiary alcohol is t-butanol.

25. A process according to claim 23 in which the tertiary alcohol is 1-methylcyclohexanol.

26. A process according to claim 22 in which the alcohol is a multifunctional alcohol containing two or more hydroxyl groups.

27. A process according to claim 22 in which the alcohol is 2,4-dimethylpentane-2,4-diol.

28. A process according to claim 1 in which the functional moiety comprises a thiol moiety or a plurality of thiol moieties.

29. A process according to claim 28 in which the thermally labile protecting group comprises a xanthate.

30. A process according to claim 1 further comprising derivatizing or further reacting the imprinted moieties.

31. A process according to claim 30 in which amine and/or thiol groups are contacted with a source of metal ion or with a semiconductor.

32. A process according to claim 31 in which the amine and/or thiol groups are contacted with a metal ion.

33. A process according to claim 32 in which the metal ion is a transition metal ion.

34. An inorganic oxide substrate comprising four or more thermolytically imprintable functional moieties; said functional moieties organized in a non-random pattern on the substrate.

35. An inorganic oxide substrate according to claim 34 in which the functional moieties are selected from amine, thiol, isocyanate, carboxyl, hydroxyl, phenoxyl, phosphate and titanate.

36. An inorganic oxide substrate according to claim 34 in which the non-random pattern comprises pairs of two different functional moieties separated from each other by substantially similar distances.

37. An inorganic oxide substrate according to claim 36 in which the functional moieties are amine and thiol moieties.

38. An inorganic oxide substrate according to claim 34 in which the pattern is a one-dimensional pattern.

39. An inorganic substrate according to claim 34 in which the pattern is a two-dimensional pattern.

40. An inorganic oxide substrate according to claim 34 in which the functional moieties do not comprise a self-assembled monolayer.

41. An inorganic oxide substrate according to claim 40 further comprising metal ions or semiconductor molecules linked to the functional moieties.

42. An inorganic oxide substrate according to claim 40 in which the pattern comprises dimensions smaller than about 100 nm and larger than about 0.5 nm.

43. An inorganic oxide substrate imprinted with a plurality of functional moieties selected from amine, thiol, isocyanate, carboxyl, hydroxyl, phenoxyl, phosphate and titanate.

44. An inorganic oxide substrate according to claim 43 imprinted with four or more of said functional moieties.

45. A particulate inorganic substrate according to claim 43.

46. A generally planar inorganic substrate according to claim 43.

47. An inorganic substrate according to claim 43 in which the inorganic oxide comprises silica, germania, alumina, titania, one or more aluminophosphates, one or more silicaaluminophosphates, ceria, indium-tin oxide, or a mixture thereof.

48. An inorganic oxide substrate according to claim 43 in which the inorganic oxide comprises silica.

49. An inorganic oxide substrate according to claim 43 in which the functional moieties are imprinted in an ordered fashion.

50. An inorganic oxide substrate according to claim 49 in which the ordered fashion is a one-dimensional pattern.

51. An inorganic oxide substrate according to claim 49 in which the ordered fashion is a two-dimensional pattern

52. An inorganic oxide substrate according to claim 43 imprinted with a plurality of amine moieties.

53. An inorganic oxide substrate according to claim 43 imprinted with a plurality of thiol moieties.

54. An inorganic oxide substrate according to claim 43 imprinted with a plurality of amine and thiol moieties.

55. An inorganic oxide substrate according to claim 43 further comprising a metallic structure having nanometric dimensions bonded to the substrate by means of the imprinted functional moieties.

56. A hydrophilic bulk inorganic oxide imprinted with one or more isolated functional moieties selected from amine, thiol, isocyanate, carboxyl, hydroxyl, phenoxyl, phosphate and titanate.

57 . A hydrophilic bulk inorganic oxide according to claim 56 comprising a silica imprinted with amine groups.

58. A hydrophilic bulk inorganic oxide according to claim 56 with a plurality of voids, each comprising a plurality of amine groups.

59. A hydrophilic bulk inorganic oxide according to claim 56 comprising a silica imprinted with thiol groups.

60. A hydrophilic bulk inorganic oxide imprinted with one or more amine or thiol functional moieties, further comprising a catalytically active metal, and having substantially no capping of free hydroxyl groups.

61. A hydrophilic bulk inorganic oxide according to claim 60 in which the metal is a transition metal.